DETAILED ACTION

Specification

The abstract of the disclosure is objected to because "relates to and extrusion method" should be "relates to an extrusion method. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 10-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Usaki et al. (US 4,889,885).

Regarding claim 1, Usaki et al. teach an extrusion process ("composite material as formed into a 12μm thick film by extrusion molding"; Column 16, Lines 52, 53; Note, montmorillonite in this passage is a layered silicate and the dimethyl terephthalate is used to form the toughness-modifier polyester.) for the preparation of toughness-modified and layered silicate-reinforced thermoplastic systems ("composed of a polymer compound and a layered silicate uniformly dispersed therein"; Column 3, Lines 17-19), characterized in that both toughness modifier and layered silicate are introduced in substantially aqueous dispersion into the compounding system and that the water from the compounding system is at least partly removed during the extrusion ("heated with stirring at 60°C for 5 hours. The resulting viscous liquid"; Column 12, Lines 13-14).

Note, because the liquid becomes more viscous as it is being heated at 60°C for 5 hours, it is inherent that some of the water has naturally been removed through evaporation.

Regarding claims 2-3, Usaki et al. further teach that the process is characterized in that the dispersions of toughness modifier and layered silicate are introduced separately into the compounding system ("In a polymerization vessel were placed 82.8 g of dimethyl terephthalate, 63.0 g of ethylene glycol, 0.05 g of calcium acetate, and 0.012 g of antimony trioxide. To the reaction system was added 25.0 g of 12-montmorillonite containing 22.3 g of water"; Column 16, Lines 32-37); characterized in that the dispersions of toughness modifier and layered silicate are introduced together into the compounding system ("After cooling to 100°C, 100 parts by weight of the mixture was mixed with 5 parts by weight of the montmorillonite which had undergone ion exchange and 25 parts by weight of styrene, followed by stirring"; Column 15, Lines 54-58). Note, in addition, the preferred embodiments disclose ways to add the materials at the same time or at different times.

Regarding claims 4-7, Usaki et al. further teach a process characterized in that the water is at least partly removed from the compounding system by evaporation during the extrusion (Column 12, Lines 13-14; Note, because the liquid becomes more viscous as it is being heated at 60°C for 5 hours, it is inherent that some of the water has naturally been removed through evaporation.); characterized in that the toughness modifiers used include natural and synthetic rubber and mixtures thereof ("The solid rubber includes natural rubber, synthetic rubber, thermoplastic elastomer, and a blend

thereof"; Column 7, Lines 1-2); characterized in that the toughness modifiers used include natural and synthetic rubber and mixtures thereof (Column 7, Lines 1-2) Note, latex could be considered natural rubber and vise versa.; characterized in that the latex or the latex mixture or the rubber or the rubber mixture is prevulcanized (For the purpose of improvement of mechanical characteristics, vulcanized rubber is incorporated; Column 10, Lines 22-26). Note, application mentions both vulcanized and non-vulcanized.

Regarding claims 10-15, Usaki et al. further teach a process characterized in that the particles of the toughness modifier have reactive groups on their surface; ("anionic surfactants for stabilization of the polymer dispersion"; Column 10, Line 66); characterized in that the toughness modifier used is contained in the compounded product of the process in an amount of 1-40 wt.-%, preferably in an amount of 5-35 wt.% ("the layered silicate in the resin should preferably be 0.05 to 150 parts by weight for 100 parts by weight of the resin"; Column 4, Lines 43-45; Note, this means this toughness modifier could be with in the range claimed) and ("The content of the layered silicate in the complex should preferably be 20-1000 parts by weight for 100 parts by weight of the liquid rubber"; Column 6, Lines 52-55, Note, this liquid rubber encompasses 40 wt.% to 10 wt. % or less).; characterized in that the layered silicate used includes natural and synthetic layered silicates which are swellable with water, preferably Na-bentonite or Na-fluorohectorite ("Na-type montmorillonite"; Column 12, Line 53). Note, montmorillonite is the major component of bentonite.; characterized in that the layered silicate is contained in the compounded product of the process in an

amount of 1-10 wt.-%, preferably an amount of 4-8 wt.-%; Column 4, Lines 43-45; characterized in that the substantially aqueous dispersion additionally contains up to 50 vol.-% of polar, water-soluble organic compounds, which include alcohols, glycols and water-soluble polymers ("The polymerization in the polymerization step may be carried out while the mixture is kept as such or after the mixture has been dispersed in a polar solvent. Examples of the polar solvent include water, ether carbon disulfide, carbon tetrachloride, glycerine, toluene, aniline, benzene, chloroform, N,N,-dimethyl formamide, phenol, tetrahydrofuran, acetone, propylene carbonate, acetic acid, methanol, ethanol, propanol, methyl ethyl ketone, pyridine, benzonitrile, acetonitrile, dimethylsolfoxide, nitrobenzene, and nitromethane. They may be used alone or in combination with one another."; Column 9, Lines 42-44). Note, alcohols, glycols and water-soluble polymers are listed; characterized in that cationic surfactants are added to the dispersion to post-stabilize the latex ("Examples of the liquid rubber include those which have polybutadiene or a modified product thereof in the main chain or a portion thereof and also have in the molecule an onium salt"; Column 5, Lines 52-55). Note, onium salt is a cationic surfactant.;

Regarding Claim 16, Usaki et al. teach an extrusion process for the preparation of toughness-modified and layered silicate-reinforced thermoplastic systems characterized in that both toughness modifier and layered silicate (Column 3, Lines 17-19) are introduced in substantially aqueous dispersion into the compounding system and that the water from the compounding system is at least partly removed during the extrusion; (a) characterized in that the water is at least partly removed from the

compounding system by evaporation during the extrusion (Column 12, Lines 13-14); and (b) characterized in that the toughness modifiers used include natural and synthetic rubber and mixtures thereof (Column 7, Lines 1-2).

Regarding Claim 17, Usaki et al. teach an extrusion process for the preparation of toughness-modified and layered silicate-reinforced thermoplastic systems, characterized in that both toughness modifier and layered silicate (Column 3, Lines 17-19) are introduced in substantially aqueous dispersion into the compounding system and that the water from the compounding system is at least partly removed during the extrusion; (a) characterized in that the water is at least partly removed from the compounding system by evaporation during the extrusion (Column 12, Lines 13-14); and (b) characterized in that the toughness modifiers used include latex and latex mixtures (Column 7, Lines 1-2). Note, for part (a) it is inherent that the temperatures used in Usaki et al. would cause evaporation. Also, for part (b) latex is a natural rubber.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Usaki et al. in view of Chao et al. (US 6,838,507 B2)

Regarding claims 8, 9, Usaki et al. teach the extrusion process according to one of claims 1 to 3. Usaki et al. does not teach the particle size of the toughness modifier.

In the same field of endeavor of making toughness modified silicate-reinforced thermoplastic, Chao et al. teach a process characterized in that the toughness modifier used has a particle size of 0.1-10 μm, preferably approximately 0.5 μm ("the first aqueous reaction mixture may be polymerized to form a first stage emulsion polymer core particle having a particle diameter of 20 to 7000 nanometers"; Column 21, Lines 3-6; Note, 20 to 7000 nanometers is 0.02 to 7 μm); characterized in that the structure of the particles of the toughness modifier consists of a core and a shell ("there is provided a core-shell nanocomposite polymer composition including a first stage core polymer, and a second stage nanocomposite shell; Column 7, Lines 22-24).

Thus, it would have been obvious to one skilled in the art at the time of the invention to combine Usaki et al. with Chao et al. for the benefit of adding controlled particle sizes to the matrix to enhance toughness.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHEN SOLLENBERGER whose telephone number is (571) 270-1922. The examiner can normally be reached from 9 am to 5 pm ET, Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angel Ortiz can be reached on (571) 272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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SJS

/Angela Ortiz/

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